REMARKS

I. INTRODUCTION

Applicants hereby respectfully request consideration of the pending application in light of the foregoing amendments and arguments to appear hereinafter.

II. CLAIMS 1-4, 6-22, 26-27, 29-39 AND 41-44

In the parent application, Examiner Enad rejected claims 1-4, 6-22, 26-27, 29-39 and 41-44 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was allegedly not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time of the application was filed, had possession of the claimed invention. Applicants respectfully submit that such rejection is overcome by appropriate amendment.

III. CLAIMS 1-2, 4, 6-9, 14, 19, 22, 26-27, 29-34, 37-38, 41 AND 43-44

In the parent application, Examiner Enad rejected claims 1-2, 4, 6-9, 14, 19, 22, 26-27, 29-34, 37-38, 41 and 43-44 under 35 U.S.C. § 103(a), as being unpatentable over Shildneck (U.S. Patent No. 3,014,139) in view of Elton et al. (U.S. Patent No. 4,854,565; "Elton ('565)"). Applicants respectfully traverse this rejection for at least the following reason: there is no proper basis to support the combination of the references.

NO MOTIVATION TO COMBINE

The Office has rejected the above claims as being obvious over Shildneck, in view of Elton ('565). Applicants respectfully request that the Examiner reconsider this rejection in view of the prevailing standard set forth below. The standard regarding such a combination is as set forth in In Re Geiger, 815 F.2d at 688, 2 USPQ2d at 1278 (Fed. Cir. 1987). This standard is that "[o]bviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, *absent some teaching, suggestion or incentive* supporting the combination." Id. (emphasis added).

The Office stated that it would be obvious to have provided in the machine of Shildneck, an inner layer having semiconducting properties, an insulating layer surrounding the inner layer and an outer layer having semiconducting properties, as disclosed by Elton ('565), in order to prevent corona discharge (emphasis added).

Shildneck is an electric machine that possesses windings formed of cable. However, the machine in Shildneck is a high current/low voltage machine, and Applicants respectfully assert that Shildneck would not work in a high voltage application that the present invention operates within.

Shildneck describes a low-voltage, high-current machine with unconventional windings. Shildneck's objective is low voltage/high current. As shown in Figs. 1-4 of Shildneck, the outermost layer of the winding (*i.e.*, element 8 in Figures 1-4) is made of an insulation material, as opposed to the semiconducting outer layer of the present invention. One object of Shildneck is to reduce the thickness required in the ground insulation (by providing a round conductor). If operated at high voltage, corona would develop in an ionized discharge path between the insulation material and the stator. The electric discharge from the insulation material to the stator would result in a deterioration of the insulation material, and would ultimately lead to a breakdown of the machine or the insulation levels would need to be much thicker, which goes against the object of the reference.

In machines operating at higher voltages, normally between 10 and 20 kV, sometimes up to 30 kV, the coil end is normally provided with an electric-field control in the form of so-called corona protection varnish intended to convert a radial electric field into an axial field, which means that the insulation on the coil ends occurs at a high potential relative to ground. The electric-field control evens out the dielectric stress of the insulating material in the end winding region, but electric field concentrations are still a severe problem in electrical machines operating at these higher voltages. Shildneck does not have any electric-field control, and such is not needed for machines, like Shildneck, operating at low voltages. Conventional insulation of conductors in electrical machines (such as so called mica-tape) is produced, to some extent, to provide resistance to partial discharge. If the ground insulation material as used by Shildneck (silicon rubber) were subjected to partial discharge, it would eventually lead to deterioration of the insulation material. Also, if Shildneck were operated at

higher voltages, the uncontrolled electric field in the end winding region would also result in high electric field concentrations causing a high dielectric stress of the insulation material, leading to deterioration of the insulation material.

Applicants recognize that Elton ('565) appears to disclose a problem with corona discharge in the art of dynamoelectric machines. Elton ('565) disclose an advantage of reduced corona discharge by applying a semiconducting layer to an insulated conductor such as an electrical transmission and distribution cable, or alternatively, to a "bar" (not a cable) used as a winding in a dynamoelectric machine. Applicants further recognize that Shildneck discloses a generator with a hollow-centered conductor type winding.

However, an important issue for the Examiner's reconsideration is exactly what Elton ('565) teach. Applicants contend it teaches mutually exclusive embodiments (*i.e.*, cable generator). When the appropriate teaching from Elton ('565) is considered, one of ordinary skill would not see an incentive to combine. Elton ('565) disclose, generally, a semi-conducting layer for insulated electrical conductors in three different embodiments, none of which are a cable winding. The first embodiment (Figures 1-6) deals with windings in a dynamoelectric machine. In this embodiment, the conductors are referred to exclusively as "windings" or "bars." The second embodiment (Figure 7) relates strictly to an electrical cable 100 used for the transmission of high voltage. Within this embodiment, the conductor is referred to as a "cable" and not as a "bar" or "winding." The third embodiment (Figure 8) relates to the use of a semiconductor layer disposed on an electrical housing surrounding digital electrical equipment. The conductor in this particular embodiment is referred to as a "housing" as opposed to a "cable," a "bar," or a "winding." In reviewing the Elton ('565) reference, the terms used were carefully chosen and applied uniformly throughout the reference.

The "invention" in Elton ('565) is the pyrolyzed glass fiber layer. Elton ('565) describes a process of immersing the winding portions in a bath of resin and vacuum pressure impregnating (VPI) the resin in the winding. The VPI process results in a cured resin having no voids or gaps between layers. The cable shown in Fig. 7 of Elton ('565) includes two pyrolyzed glass fiber layers, layers 104 and 110.

> The internal grading layer [104] is a semi-conducting pyrolyzed glass fiber layer as disclosed herein. . . . An insulation 106 surrounds internal grading layer 104. On the external surface of insulation 106, a semi-conducting pyrolyzed glass fiber layer 110 equalizes the electrical potential thereon.

(Elton ('565): column 7, lines 19-26).

As further evidence that cable 100 shown in Fig. 7 of Elton ('565) would not be suitable as a winding in an electric machine, having two pyrolyzed glass fiber layers would cause the cable to be prohibitively stiff and not suitable for threading the winding through the stator slots. It may be possible to VPI the entire stator in a large resin bath after it had been wound with a flexible cable. However, such a process would not be feasible to produce both the internal grading layer 104 and the external layer 110 since an insulation layer 106 surrounds the internal grading layer 104 and both layers 110 and 104 would need to be exposed to the resin. Accordingly, while Elton et al. ('565) describes how to provide a pyrolyzed glass fiber layer for a bar-type winding, Elton ('565) does not teach or suggest that cable 100 of Fig. 7 in Elton ('565) could be used for such a purpose, especially since cable 100 would be stiff, not flexible as the Office contends.

Elton ('565) recognizes that in the end-winding region just outside of the stator of an electric machine, there will be problems caused by strong electric fields. As a solution, Elton ('565) describes using a known grading near the stator to allow some of the accumulated charge to bleed off to the stator, thus reducing the risk of arcing, but Elton ('565) offers no other solutions to the problems in the end-winding region. The strong electric fields will be present throughout the end-winding region, not just near the stator. The grading used in Elton ('565) will help to lessen the effects of the strong electric fields near the stator, but will not address the problems in the end-winding region away from the stator, further evidence that Elton is describing a conventional bar-type winding. Elton ('565) uses formed, rigid bar-type windings which are able to withstand mechanical stresses caused by induced fields between the windings in the end-winding region, where electromagnetic fields are not contained in the winding. The mechanical rigidity of the bar-type windings suppress the amount of vibration in the end-winding region that would otherwise be present. The fact that a grading system is used to lessen the end-winding region problems near the stator in Elton

('565) is further evidence that Elton ('565) does not suggest using cable 100 as a winding of a machine, since such a cable would not have a grading.

The present invention specifically embodies a flexible cable winding and cable structure. The cable allows for a continuous full turn, making a joint in the end winding unnecessary. This, along with the fact that the outer surface of the cable is grounded, allows for the confinement of the electric field resulting in the diminished risks of losses and damage in the end-winding region. Elton ('565) may teach a cable, however, in no way does it teach the cable as a winding.

In view of the foregoing, Applicants submit that there is no incentive to combine Shildneck and Elton ('565) because the advantage of reduced corona discharge cannot be obtained. Specifically, the advantage of Elton ('565) can only be obtained by following the teachings of Elton ('565), which, for a dynamoelectric machine, means a "bar" with one layer of semiconducting material, and not cable 100. Therefore, there is no incentive to combine, as contended, when the advantage does not materialize.

Moreover, there is no likelihood of success. The MPEP § 706.02(j) sets forth the burden that the Office must carry in order to reject claims based on obviousness. One criteria that must be met is that there must be a reasonable expectation of success. This criteria cannot be met when the aforementioned references are combined.

Assuming for the sake of argument that the cable 100 recited in Elton ('565) is combined with the cable windings of Shildneck, there is no likelihood of success because of the inflexibility and brittleness of the Elton ('565) cable 100. Cable 100 possesses a pyrolyzed glass fiber layer which would crack when attempted to be wound around a core, thereby promoting, not prohibiting, corona discharge. It is, therefore, not surprising that Elton ('565) makes no disclosure of the use of the cable 100 as a "winding" in a dynamoelectric machine.

For at least the foregoing reasons, Applicants respectfully submit that the critical link in the Office's chain of reasoning, *i.e.,* incorporating the cable 100 and associated features taught by Elton ('565) into the machine of Shildneck, is improper. Applicants further submit that the series of logical steps required to be made are simply not taught nor suggested in the

Shildneck and Elton ('565) references, and that it would not have been obvious to one skilled in the art to make the stated modifications in light of Shildneck and Elton ('565).

Accordingly, Applicants respectfully submit that claims 1, 19, 29, 43 and 44 define novel and non-obvious subject matter. Applicants further respectfully request that the rejection be reconsidered and withdrawn.

Dependent claims 2, 4-9, 14, 22 and 26-27 include all of the limitations of base claim 1, and therefore, for at least the same reasons set forth above, the rejection of these claims is improper. Similarly, dependent claims 30-34, 37-38, and 41 include all of the limitations of base claim 29, and likewise, for at least the same reasons set forth above, the rejection of these claims is improper. Applicants respectfully request that all of these rejections be reconsidered and withdrawn.

IV. CLAIMS 3, 10 AND 35-36

In the parent application, Examiner Enad rejected Claims 3, 10 and 35-36 under 35 U.S.C. § 103(a), as being unpatentable over Shildneck (U.S. Patent No. 3,014,139) in view of Elton et al. (U.S. Patent No. 4,853,565; "Elton ('565)"), and further in view of Elton et al. (U.S. Patent No. 4,622,116; "Elton ('116)"). The Office asserted that it would have been obvious to have formed the insulation of Shildneck and Elton ('565) such that the different layers of insulation had similar or the same coefficient of thermal expansion, as disclosed by Elton ('116), in order to prevent failure caused by thermal aging and cycling. Applicants respectfully traverse this rejection for at least the following reasons: (i) there is no proper basis to support the combination of the references, and (ii) the rejected claims are dependent on claim 1 or claim 29 (both believed allowable), therefore, the dependent claims above are likewise allowable.

Applicants submit that for at least the reasons set forth in section III above regarding the impropriety of combining the Shildneck, and Elton ('565) references, it is also improper in this rejection. Applicants further assert that it is improper to additionally combine the Elton ('116) reference because the base combination is improper, therefore, any broader combination is also improper. Moreover, even such a combination would not meet every limitation of the claimed invention.

Elton ('116) only teach the configuration of a first insulation layer and a second insulation layer, each having the same coefficient of thermal expansion. However, the present invention claims a semiconducting layer, an insulation layer, and a second semiconducting layer, with at least two of these layers having the same coefficient of thermal expansion. The present invention consists of two (2) semiconducting layers surrounding an insulation layer, whereas Elton ('116) consists of two insulation layers. The two configurations are completely different, and therefore, Elton ('116) cannot teach the present invention.

Additionally, the insulation method of the conductor disclosed in Elton ('116), is substantially different from the present invention because it utilizes different materials for each of the different layers that are joined together in a complicated process, resulting in heightened susceptibility to electric field stress. Electric field stress is a problem in a high voltage rotating electric machine where large electrical and mechanical forces are at play. Increased electric forces are common in high current operations because of the interaction of the high current and the magnetic flux from the rotor, which can produce alternating force on the conductor. These increased forces cause vibrations in the conductors, particularly at the end windings, causing the assurance of the windings mechanical integrity to diminish.

Conversely, the cable employed in the present invention, with the inner and outer layers being semiconductive and the outer layer being grounded, provides more protection against electric field stress. The cable, as opposed to a bar conductor, allows for high voltage/low current operation, thus the vibrations and stress caused by high current operations are reduced. The semiconductive layers allow for equipotential surfaces to be created, thereby confining the electric field within the cable. Self-containing the electric field and operating at lower currents allows for reduced vibration in the end winding, thus assuring the mechanical integrity of the cable windings.

As an additional basis for allowability, Applicants submit that dependent claims 3 and 10 include all of the limitations of base claim 1 (believed allowable); and dependent claims 35-36 include all of the limitations of base claim 29 (believed allowable), therefore, for at least the reasons set forth above, the rejection of these dependent claims is also improper.

Accordingly, for the at least the forgoing reasons, reconsideration and withdrawal of this rejection is respectfully requested.

V. CLAIMS 11-13

In the parent application, Examiner Enad rejected Claims 11-13 under 35 U.S.C. § 103(a), as being unpatentable over Shildneck (U.S. Patent No. 3,014,139), in view of Elton et al. (U.S. Patent No. 4,853,565; "Elton ('565)") and further in view of Laurell (U.S. Patent No. 4,692,731). The Office submitted that it would have been obvious to have arranged the conductors of Shildneck and Elton ('565) such that some of the conductors were insulated from one another in order to provide a multiple core cable, and to have provided a metal screen surrounding the cable to shield it, as disclosed by Laurell. Applicants respectfully traverse this rejection for at least the following reasons: (i) there is no proper basis to support the combination of the references, and (ii) the rejected claims are dependent on claim 1 or claim 29 (believed allowable), therefore, the dependent claims above are likewise allowable.

Applicants submit that the rejection is traversed for at least the same reasons as set out in section III above pertaining to the combination of Shildneck and Elton ('565). Because the base combination of Shildneck and Elton ('565) is improper, a broader combination including Laurell is also improper.

In any event, even in a fictional combination, not every limitation of the invention is met. For instance, the Office states in its rejection that it would have been obvious to have provided a metal screen surrounding and shielding the cable. Applicants refer the Examiner's attention to lines 32-39 on page 8 of the specification, which state that "the metal screen normally surrounding such power distribution cables [is] eliminated . . . ." Therefore, the Laurell reference cannot meet every limitation of the claimed invention.

The Office stated that Laurell teaches a high voltage cable with "conductors clumped together (figure 1), or some of the conductors separated and insulated from other conductors (Figure 2)." As a matter of definition, Applicants interpret the Office's use of the term "conductor" to have an impermissible dual meaning. In order to meet the "uninsulated conductor" limitation, the Office appears to refer to each strand of the cable as a conductor.

In order to meet the "insulated conductor" limitation, however, the Office refers to a group of strands together as a "conductor."

While Applicants fully intend to broadly construe the meaning of its claims, uniformity in word choice is a necessity. One cannot define a word to mean one thing in a claimed invention, and then change its meaning to be substantially different in the same invention. Defining a collection of strands as a conductor, and then defining each individual strand as a conductor is improper and impermissible. A single meaning must attach to a word, and that meaning must be sustained throughout the case. The Office uses the differing meanings of the word "conductor" to encompass a number of distinct features of the present invention. This, Applicants respectfully submit, is improper.

The cable in the present invention comprises insulated and uninsulated strands to allow for the reduction of Eddy currents in the winding of an electromagnetic device. Eddy currents are created by exposing the winding to high magnetic fields and they are problematic because they result in electrical losses. These losses are in the form of thermal energy, and too much thermal energy in a rotating machine can cause additional reliability problems. It had been the conventional design to construct the windings in high voltage machines of bars with multiple rectangular strands. These strands allowed for the short side of the rectangular cross-section to be exposed to the magnetic field, thereby minimizing the amount of Eddy current induction by shortening the path. The insulated strands in the present invention reduce Eddy current losses by restricting the paths for such currents between the conductive strands. However, it is necessary to employ at least one uninsulated strand to make contact with the semiconducting layer in order set up an equipotential field, thereby facilitating the confinement of the electric field within the cable. Laurell, on the other hand shows an embodiment with three separately bundled cables operating at different voltages, thus making the separation of each bundle essential. Nowhere in the reference is it mentioned that at least one grouping of strands (or "conductor" as referred to by the Office) is uninsulated in order make contact with the semiconductive layer, thereby creating the equipotential surface. The embodiment discussed in Laurell with one "conductor" (Figure 1) is also substantially different from the present invention in that it is not comprised of insulated and uninsulated

strands. Applicant interprets the embodiment to consist of a grouping of uninsulated strands surrounded by an insulating layer. This is not what is claimed by the present invention.

Accordingly, Applicants assert that the combination of the Laurell reference is improper because it does not teach a conductor having insulated and uninsulated strands, as is contended. Therefore, because the reference does not teach what the Office asserts it does, no incentive or motivation exists to combine the reference to the Shildneck/Elton ('565) combination.

As an additional basis for allowability, Applicants submit that dependent claim 11 includes all of the limitations of base claim 1 (believed allowable), and dependent claims 12-13 include all of the limitations of base claim 29 (believed allowable), therefore, for at least the reasons set forth above, the rejection of these dependent claims is also improper.

Accordingly, for at least the foregoing reasons, Applicants respectfully request that the rejection of claims 11-13 be reconsidered and withdrawn.

VI. CLAIMS 15-16

In the parent application, Examiner Enad rejected claims 15-16 under 35 U.S.C. § 103(a), as being unpatentable over Shildneck (U.S. Patent No. 3,014,139) in view of Elton et al. (U.S. Patent No. 4,853,565; "Elton ('565)") and further in view of Bernhardt (U.S. Patent No. 3,887,860). The Office stated that it would have been obvious to have provided a static machine in series with the connection to the motor of Shildneck and Elton ('565) in order to protect the motor, as disclosed by Bernhardt. Applicant respectfully traverses this rejection for at least the following reasons: (i) there is no proper basis to support the combination of the references, and (ii) the rejected claims are dependent on claim 1 (believed allowable), therefore, the dependent claims above are likewise allowable.

Applicants submit that for at least the same reasons stated in section III above in connection with claim 1 regarding the impropriety of combining the Shildneck and Elton ('565) references, it is also improper in this rejection. Applicants further submit that the combination of the Bernhardt reference with the Shildneck and Elton ('565) references is also

improper because the base combination is improper, therefore, any broader combination is likewise improper.

Moreover, Applicants further submit that the specific cable dimensions are selected for high voltage operation in a cable winding that is likely to be exposed to high currents, not just a mere matter of choice. Although the machine is to operate at high voltage and low current levels, high currents can develop and the conductor must be dimensioned in a way to withstand these currents. It is not simply an arbitrary choice of cable size. That being said, Applicants question the validity of using "engineering design choice" as a basis for rejection.

Applicants further submit as an additional basis for allowance, that dependent claims 15-16 include all of the limitations of base claim 1 (believed allowable), and therefore, for at least the same reasons set forth above, the rejection of this dependent claim is improper.

Accordingly, Applicants respectfully request that the rejection of claims 15-16 be reconsidered and withdrawn.

VII. CLAIMS 17-18

In the parent application, Examiner Enad rejected claims 17-18 stand rejected under 35 U.S.C. § 103(a), as being unpatentable over Shildneck (U.S. Patent No. 3,014,139) in view of Elton et al. (U.S. Patent No. 4,853,565; "Elton ('565)"), and further in view of Hyde (U.S. Patent No. 4,365,506) and Herr et al. (U.S. Patent No. 4,355,255). The Office asserted it would have been obvious to have connected the neutral point of the machine of Shildneck and Elton ('565) to ground, as shown by Hyde and Herr, in order to protect the machine and reduce harmonics. Applicants respectfully traverse this rejection for at least the following reasons: (i) there is no proper basis to support the combination of the references, and (ii) the rejected claims are dependent on claim 1 (believed allowable), therefore, the dependent claims above are likewise allowable

Applicants submit that for at least the same reasons stated in section III above in connection with claim 1 regarding the impropriety of combining the Shildneck and Elton ('565) references, it is also improper in this rejection. Applicants assert that the claimed

features are part of a patentable combination and therefore should be allowed. Applicants further assert that the additional combination of the Hyde and Herr et al. references with the Shildneck and Elton ('565) references is unsupported because the base combination is improper, thereby rendering any broader combination improper.

Additionally, while the connection of a machine's neutral point to ground in order to protect the machine is generally a basic, well-known methodology in the field of art, the standard in judging obviousness involves assessing the invention as a whole. Nowhere does Hyde and Herr teach this arrangement in the context of the claimed "plant" having a "winding" of the type claimed. Hyde and Herr simply disclose carrying out this methodology in a conventional context.

Accordingly, for at least the foregoing reasons, Applicants hereby respectfully request that this rejection be reconsidered and withdrawn.

VIII. CLAIMS 20-21 AND 42

In the parent application, Examiner Enad rejected claims 20-21 and 42 under 35 U.S.C. § 103(a), as being unpatentable over Shildneck (U.S. Patent No. 3,014,139) in view of Elton et al. (U.S. Patent No. 4,853,565; "Elton ('565)"), and further in view of Neumeyer et al. (U.S. Patent No. 4,207,482). The Office submitted that it would have been obvious to have formed the machine of Elton ('565) such that it can withstand voltages in excess of 36kV, as disclosed by Neumeyer, in order to allow higher capacity operation of the machine. Applicants respectfully traverse this rejection for at least the following reasons: (i) there is no proper basis to support the combination of the references, and (ii) the rejected claims are dependent on claim 1 or claim 29 (both believed allowable), therefore, the dependent claims above are likewise allowable.

Applicants submit that for at least the same reasons stated on section III above in connection with claim 1 regarding the impropriety of combining the Shildneck and Elton ('565) references, it is also improper in this rejection. Applicants assert that the additional combination of the Neumeyer et al. reference with the Shildneck and Elton ('565) references

is also improper because the base combination is improper, therefore, any broader combination is likewise improper.

Moreover, Neumeyer does not disclose any sort of cable as the present invention employs, rather it employs a rectangular conductor. Additionally, the method disclosed in Neumeyer is applicable to voltage levels around 35kV, which is much lower than the voltage class applicable to the present invention. An ordinary high voltage machine typically has an operating voltage of 30kV and below. However, the machines of the present invention operate at a much higher voltages. The rejected claims clearly state that the plant as claimed is connectable to a distribution network having a supply voltage in excess of 36kV, without the need of a step-down transformer. Neumeyer limits itself to operation in the 35kV voltage class of machines. The present invention and the Neumeyer reference are not, therefore, within the same class of high voltage machines. There is no incentive or motivation within Neumeyer to one of ordinary skill in the art that justifies the combination of this reference with the Shildneck and Elton ('565) references because of the differing voltage level applications.

Additionally, Applicants submit that dependent claims 20-21 depend on base claim 1 (believed allowable), and dependent claim 42 depends on base claim 29 (believed allowable). Therefore, the dependent claims include all of the limitations of base claim 1 or base claim 29. For at least the same reasons set forth above, Applicants submit that the rejection of these dependent claims is improper.

For at least the foregoing reasons, Applicants respectfully request that the Office reconsider and withdraw this rejection.

IX. CONCLUSION

For the foregoing reasons, all presently pending claims are now believed to be in condition for allowance. Early notice of the same is hereby respectfully requested.

Respectfully submitted,

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